

# GaN wafer for GaN-on-GaN Power Electronics



- Technology Description/Status/Application

SixPoint Materials develops gallium nitride (GaN) substrates, which are the key foundation of various GaN-based semiconductors demanded in ENERGY, DEFENCE, WIRELESS and INDUSTRIAL technologies. Medium voltage (MV: 10-20 kV) power switches will be used for solid-state transformers in smart grids and will reduce 5% of US CO<sub>2</sub> emission. MV DC power systems are demanded in Navy battleships. GaN-based RF devices will be used for radars as well as 5G base stations. Ultra-high power blue lasers will be used for laser machining. Under the ARPA-E SWITCHES program, SixPoint has demonstrated industry-standard 2" GaN substrates with lower defect density than the other substrates in the market. In addition, our collaborators demonstrated usability of our GaN substrates with 1200V diodes. SixPoint has established production method of 2" GaN substrates, which is protected with over 100 allowed world-wide patents. SixPoint is ready for pilot production of low-defect GaN substrates for GaN-based semiconductors.

- Proposed Pilot with Funding needs

Our growth method of GaN crystals is similar to that of synthetic quartz, which requires a few months to complete one batch. Currently, SixPoint runs one pilot production reactor. To accelerate the pilot production, we plan to add two more reactors at the existing site in Buellton, CA. With three reactors running, we crop grown crystals almost every month, yielding about 3,600 wafers with \$3M revenue annually. In addition, we will commercialize MOCVD epitaxial wafers developed under SWITCHES program. Through this pilot program, we will prove business viability including, productivity, profitability and scalability. Total project period 3 years, Total project cost \$5M. Fabrication and installation of reactors will take about 1 year. Time to evaluate the full operation of the reactors will take about 2 years. Equipment cost \$3M, running cost \$2M.

- Contact information

SixPoint Materials, Inc., Buellton CA 93427, Dr. Tadao Hashimoto, [tadao@spmaterials.com](mailto:tadao@spmaterials.com), [www.spmaterials.com](http://www.spmaterials.com)